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# Insights into circumglobal Rossby wave patterns from space/time spectral analysis

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Circumglobal Rossby wave patterns (CRWPs) are large-scale configuration characterized by amplified Rossby waves stretching in the zonal direction across a broad portion of a latitude circle. Previous research considered CRWPs mainly from two points of view: either as particular type of planetary wave, undergoing quasi-resonant amplification when trapped between two turning latitudes, or as a single Rossby wave packet (RWP) being ducted zonally in presence of particularly strong meridional potential vorticity gradient, that acts as a waveguide. Although with different characteristics, a structured waveguide for Rossby waves is needed in both cases.

Space/time spectral analysis allows to study CRWPs from their spectral projection over a range of wavenumber/phase speed harmonics, with the implicit assumption that a CRWP would project only over few zonal wavenumbers and propagation speeds characterizing it over a broad portion of the hemisphere. Such spectra are calculated from meridional wind at 250hPa over a sliding time window of 61d, in order to consider the intraseasonal variability in spectral power. The application of principal component analysis to this data set allows for few leading variability modes in the spectral domain during boreal winter, and these modes appear to be related to CRWPs.

They correspond to the baroclinic propagation of amplified RWPs from the Pacific to the Atlantic storm track in a hemispheric flow configuration displaying enhanced meridional gradients of geopotential height over midlatitudes. The first CRWP is forced by tropical convection anomalies over the Indian Ocean and features the propagation of amplified Rossby wave packets over northern midlatitudes, while the second one propagates rapidly over latitudes between 35□N and 55□N and appears to have extratropical origin. An anomalous equatorward propagation of Rossby waves from the Atlantic eddy-driven jet to the North African subtropical jet is observed for both CRWPs These results support the perspective that CRWPs are substantially related with the circumglobal propagation of RWPs.